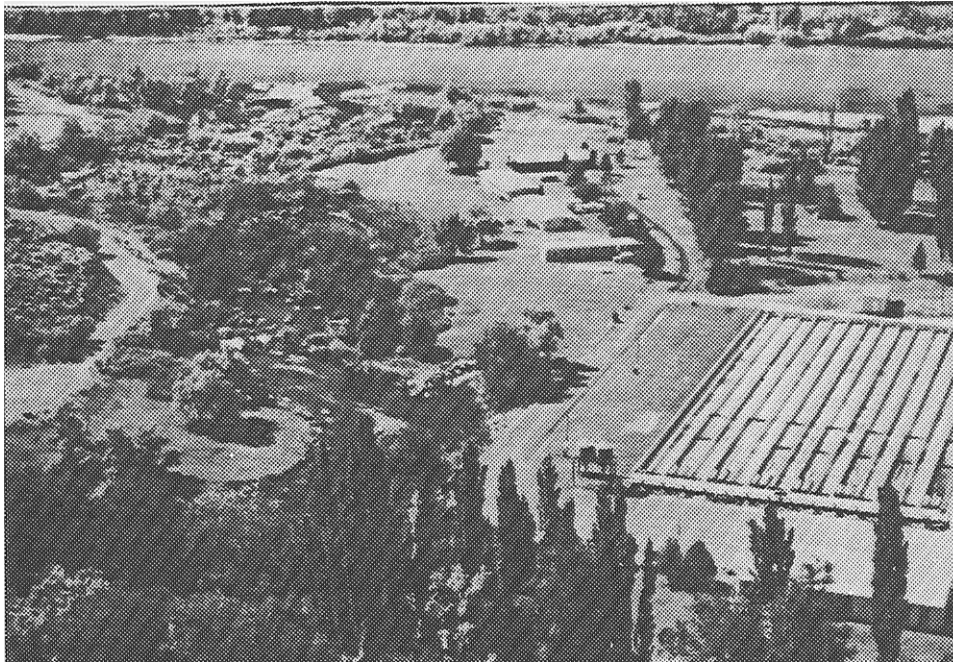




NIAGARA SPRINGS FISH HATCHERY

1993 Steelhead Brood Year



by

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ABSTRACT

Niagara Springs Hatchery received 954,294 eyed steelhead *Oncorhynchus mykiss* eggs (Salmon River stock) from Pahsimeroi Hatchery, and 1,436,796 eyed eggs (Snake River stock) from Oxbow Hatchery for a total of 2,391,090 eggs. Egg shipments were received April 20 through June 11, 1992.

On April 16 a total of 72,800 eyed eggs were shipped to the production facilities of Lynn Babbington, a private contractor. Babbington also received 511,360 adipose-clipped fingerlings for rearing to smolt from November 9 through 15. Babbington acquired these fish after they survived a severe outbreak of Infectious Hematopoietic Necrosis Virus (IHN) and health problems in his ponds were minimal. A 91% survival rate to stocking was achieved.

A total of 536,302 smolts (130,916 lbs at 4.1 fish/lb) were released into the Snake and Salmon rivers. The Snake River below Hells Canyon Dam received 343,280 smolts (86,335 lbs at 3.98 fish/lb) from April 25 through May 1, while 193,022 smolts (44,581 at 4.33 fish/lb) were released at the Hammer Creek boat ramp on the Salmon River from May 2 through May 5.

At Niagara Springs, summertime mortalities caused by IHN reduced the inventory to below levels required for Idaho Power Company (IPC) mitigation; consequently 338,026 fingerlings (19.68 fish/lb) were received from Hagerman National Fish Hatchery (HNFH) on November 17.

Spring smolt releases from Niagara Springs Hatchery totaled 1,001,794 fish (219,185 lbs at 4.5 fish/lb), while an additional 511,036 fingerlings were shipped to Babbington in the fall. These resulted in releasing 343,280 smolts into the Snake River at Hell's Canyon Dam, and 193,022 into Hammer Creek. A total of 379,948 smolts (77,510 lbs at 4.8 fish/lb) were released into the Pahsimeroi River; the Salmon River at McNabb Point (Challis) received 199,962 smolts (43,660 lbs at 4.6 fish/lb); the Salmon River at the North Fork of the Salmon River received 134,979 fish (28,865 lbs at 4.7 fish/lb); and the Salmon River at Pine Bar Rapids received 21,070 smolts (4,900 lbs at 4.3 fish/lb). A total of 265,835 smolts (64,250 lbs at 4.14 fish/lb) were stocked into the Snake River below Hells Canyon Dam.

A total of 289,686 pounds of feed was fed (272,420 lbs of Rangen[®] feed and 17,266 lbs of Bioproducts feed) at a cost of \$94,807 to produce 242,322 pounds of fish at Niagara Springs. The conversion rate was 1.19:1.

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INTRODUCTION

Niagara Springs Hatchery is owned and financed by Idaho Power Company (IPC), and operated and staffed by the Idaho Department of Fish and Game (IDFG). It is located in the mid Snake River Canyon, ten miles south of Wendell, Idaho. Niagara Springs is one of four hatcheries IPC owns and IDFG staffs and operates that fulfill IPC's mitigation requirement under the Federal Energy Regulatory Commission (FERC) license. The goal of Niagara Springs Hatchery is to rear 400,000 pounds of steelhead *Oncorhynchus mykiss* smolts. Originally, these smolts were used to relocate a portion of the Snake River steelhead run into the Salmon River. Now, 200,000 pounds of production is used to enhance the steelhead run in the Snake River below Hells Canyon Dam, and 200,000 pounds are stocked in the Salmon River.

OBJECTIVES

The two major mitigation requirements that must be met at IPC's Niagara Springs Hatchery are to produce quality steelhead smolts to supplement the steelhead trout runs in the Snake River below Hells Canyon Dam and in the upper Salmon River and its tributaries by successfully meeting these objectives:

1. To rear 200,000 pounds of quality steelhead smolts to be released in the Salmon River and its tributaries. These are to return as adults to the Salmon River in sufficient numbers to provide a quality sport fishery in these waters and supply sufficient broodstock (1,000 adults) to the Pahsimeroi Hatchery for collection of spawn for the next production cycle.
2. To rear 200,000 pounds of quality steelhead smolts to be released in the Snake River below Hells Canyon Dam. These are to return as adults in sufficient numbers to provide a quality sport fishery in the Snake River and supply sufficient broodstock (1,000 adults) to the Hells Canyon Trap for collection of spawn for the next production cycle.

IDAHO FISH AND GAME GOALS

1. Provide quality steelhead smolts to the Snake and Salmon rivers that will survive the downstream migration and return as adults in sufficient numbers to provide a quality sport fishery in these rivers and their tributaries.
2. Provide quality hatchery steelhead for supplementation where the wild stocks of steelhead have diminished below desired levels and where managers feel a quality hatchery steelhead would enhance the fisheries resource.
3. Enhance the genetic quality of hatchery stocks through management and hatchery practices that favor genetic variability and the wild genetic component.

FACILITY DESCRIPTION

Spring water supplies 20 upwelling incubators and 20, 6-ft wide circular vats for hatching and early rearing. These 20 incubators provide space for hatching and early rearing for up to 1.2 million steelhead eggs. The early

rearing vats provide a total of 1,130 cubic feet, providing rearing space for 1.2 million fry for up to 30 days.

Spring water is delivered to 14, 300-ft x 10-ft x 3-ft raceways from June through April. Excluding the 50-ft quiescent zones for waste settling, these raceways furnish 87,500 cubic feet of rearing area. This allows for a total production of 250,000 pounds of 8-inch steelhead smolts without exceeding the recommended 0.35 density index. Niagara Springs water is also available for domestic use, irrigation of ten acres of lawn, and for fire hydrants.

Buildings on the hatchery grounds include four residences (three wood frame houses and a mobile home); one metal building (32-ft x 80-ft) containing an office, two incubator rooms, a workshop, and garage; a small storage building (10-ft x 30-ft); and a metal building (20-ft x 10-ft) which stores a 20-ton chiller unit.

WATER SUPPLY

Niagara Springs supplies water to IDFG's Niagara Springs Wildlife Management Area, Rim View Trout Company, Idaho State's Pugmire Park, and IPC's Niagara Springs Steelhead Hatchery. The 220 cubic feet per second (cfs) of water is divided based on several water rights. Niagara Springs Steelhead Hatchery has a water right for 132 cfs.

Water is a constant 58°F (Table 1), and gravity flows to the hatchery for incubators and early rearing vats, raceways, irrigation, fire hydrants, and domestic use.

Increased demand on the aquifer by agricultural and domestic uses has caused a decline in both quantity and quality of water in the spring. As ground water demands have expanded and drought conditions continue, the springs have declined by 30% to 40% of historic conditions.

STAFFING

The IDFG staffs the hatchery with four permanent employees and three temporary employees. Hatchery management is handled by a Hatchery Superintendent III (Jerry Chapman) and assisted by a Hatchery Superintendent I (Gary Bertellotti). There are two Fish Culturists (Roger Elmore and Russ Wood) present for operations of the facility. Jerry Mowery, Hatchery Superintendent III, retired on December 31, 1993, and Fish Culturist Callee Davenport transferred to another hatchery in brood year 1993. During periods of peak work loads, there are three temporary employees (two Bio-aides and one Laborer) that assist the permanent staff with culture, maintenance, and other needed assignments.

FISH PRODUCTION

Egg Shipments and Early Rearing

Niagara Springs Hatchery received eyed eggs from Oxbow Hatchery and Sawtooth Hatchery (Table 2). Green eggs were taken at the Pahsimeroi Hatchery and sent to Sawtooth until eyed, and then sent to Niagara Springs. Oxbow shipped 1,436,796 Snake River stock eyed eggs to Niagara Springs between April 20 and May 7, 1993. Lynn Babbington received 72,800 eyed eggs from Oxbow on April 16, 1993.

Table 1. Water analysis of Niagara Springs Fish Hatchery, April 22, 1994.

Analysis	Results (mg/l)	Maximum contamination level
General		
Alkalinity	166.000	
Hardness	234.000	
pH	8.000	
Phosphorus	0.600	
Primary		
Antimony	0.002	0.006
Arsenic	0.005	0.050
Barium	0.100	1.000
Beryllium	0.0002	0.004
Cadmium	0.00034	0.005
Chromium	0.002	0.100
Copper	0.010	1.300
Lead	0.002	0.015
Mercury	0.0002	0.002
Nickel	0.003	0.100
Selenium	0.005	0.050
Sodium	30.800	
Thallium	0.0006	0.002
Other		
Cyanide	0.005	0.200
Fluoride	0.570	4.000
Iron	0.010	0.300
Nitrite	0.010	1.000
Nitrate	1.630	10.000
Sulfate	60.700	
Radiology	Gross Beta	2.800 pCi/l
	Gross Alpha	4.000 pCi/l
		50.000
		15.000

Table 2. Niagara Springs Hatchery survival of steelhead from eyed egg to fry to smolt.

Egg source	Eyed eggs received	Number fry inventoried	Percent survival eyed egg to fry	Percent survival smolts released	Percent survival fry to smolt	Eyed egg to smolt
Pahsimeroi	954,294	817,103	85.62%	421,833	51.63%	44.20%
Oxbow	1,509,596 ^a	1,050,000 ^b	69.55%	787,542 ^{c,d}	75.00%	52.16%
Pahsimeroi/ Hagerman National Fish Hatchery		338,026 ^e	96.00%	328,721	97.24%	93.36%
Total	2,463,890	2,205,129	83.72%	1,538,096	74.62%	63.24%

^a Includes 72,800 eggs shipped to Babbington.

^b Includes 511,360 fish shipped to Babbington.

^c Includes 193,022 fish from Babbington's production to Hammer Creek.

^d Includes 343,280 fish from Babbington's production.

^e Fry received from Hagerman National Fish Hatchery (HNFH).

Sawtooth shipped 954,294 Salmon River eyed eggs to Niagara between May 21 and June 11, 1993. A total of 2,391,090 eyed eggs were received at Niagara Springs Hatchery (Appendix A).

All eggs were treated with an iodophor solution (1:100 Argentyne) for disease control upon delivery. Eggs were enumerated using the displacement method, then 50,000 to 136,000 eggs were placed in each upwelling incubator. Flow through each incubator was 10 to 40 gallons per minute. Egg stocks were isolated to prevent disease transfer and to maintain stock separation.

With only 20, 6-ft circular vats for early fry rearing, sac fry were at a density index which was detrimental to fish health. Beginning density indexes ranged from 0.55 to 1.44.

Suffocation was the primary cause of mortality, although higher densities also resulted in stress, oxygen depletion in the vats, and transmission of bacterial and fungal pathogens. Pahsimeroi stock had an 85.62% survival rate from the eyed egg stage to ponding, while Hells Canyon had a survival rate of 78.5%. Because of a shortage of vat space and high densities, fry had to be transferred to outside nursery areas before reaching an optimum (400-600 fish/lb) size. Since fry were transferred at a smaller size (1,000-1,500 fish/lb), mortality was higher than expected (16.28%).

Fry were ponded into chlorinated, bright white raceways. This caused stress and inhibited the feeding response which resulted in poor feed conversions. Locations in the raceway readily accepted by fry are the shaded area provided by coverings placed on top of raceway walls and the shaded area underneath the bridge.

Soon after ponding, local populations of blue herons and black crown night herons start arriving en masse to feed on fry. An attempt to put up bird netting was unsuccessful as the birds found ways to get under the nets. The fish mortality due to IHN/V began within two to three weeks after the arrival of the birds.

Final Production Rearing

To fulfill mitigation goals and be in compliance with current Environmental Protection Agency (EPA) discharge standards at Niagara Springs, part of the production was contracted out to Lynn Babbington. Babbington received 72,800 eyed eggs from Oxbow and an additional 511,359 adipose fin-clipped fingerlings on November 9 through November 15 and December 2 and 3. Of these, there were 103,699 coded wire tagged (CWT) and left ventral (LV) fin-clipped.

Shipping started on April 25 at Lynn Babbington's with smolts hauled to Hells Canyon. After seven days, a total of 343,280 smolts weighing 86,335 pounds were transported. There were 40,940 CWT smolts, 200 Passive Integrated Transponder (PIT) tagged smolts, and the average size was 3.98 fish/lb (Table 3).

The remaining part of Babbington's production was stocked into the Salmon River at the Hammer Creek boat ramp. Hauling and planting began on May 2 and ended on May 5. There were 193,022 smolts weighing 44,581 pounds. Of these, 60,384 were CWT smolts, 300 PIT-tagged smolts, and the average size was 4.33 fish/lb.

Babbington's fish had a 91% survival rate and their pre-release health check indicated generally healthy fish with no apparent problems. However, gills were marginal in a few cases with gill disease present.

Table 3. Steelhead smolt distribution in the Salmon and Snake rivers.

Destination	Weight	Number/ pound	Number released
Niagara Springs			
Pahsimeroi Weir	77,510	4.8	379,948
North Fork Salmon River	28,865	4.7	134,979
McNab Point (Challis)	43,660	4.6	199,962
Pine Bar Rapids	4,900	4.3	21,070
Hells Canyon Dam	64,250	4.1	265,835
Total	219,185	4.5	1,001,794
Babbington			
Hells Canyon Dam	86,335	3.98	343,280
Hammer Creek	44,581	4.33	193,022
Total	130,966	4.16	536,302

At Niagara Springs, summertime mortalities caused by IHNV reduced the inventory to below levels required for mitigation. Hagerman National Fish Hatchery agreed to provide their excess fish to restore inventory levels.

On November 17 and 18, IDFG tankers transported 338,026 fish, which were put into raceways 6 through 10. These Pahsimeroi stock fish had been adipose fin-clipped and averaged 19.68 fish/lb. A pre-release health inspection of these fish determined that they were positive for Infectious Hematopoietic Necrosis Virus (IHNV) virus. However, no increase in mortality was observed from Infectious Pancreatic Necrosis Virus (IPNV).

Raceway inventories were established after adipose fin clipping. Raceways 1 through 5 contained Pahsimeroi stock fish hatched at Niagara Springs. Raceways 6 through 10 contained fish that came from Hagerman National Fish Hatchery, and raceways 11 through 14 consisted of Hells Canyon stock from Oxbow Hatchery. Normal fish cultural techniques included feeding fish, pound counts, sweeping raceways, cleaning screens, and removing mortalities. Observation of fish health took place until release in April.

A combination of Bioproducts™ and Rangen™ fish foods were fed over the course of the brood year. Bioproducts feed was fed from the swim-up stage until fish reached approximately 100 fish/lb, then Rangen feed was used until release. A total of 289,686 pounds of feed (17,266 lbs Bioproducts and 272,420 lbs Rangens™) was fed at a cost of \$94,807.95 (Table 4). The average cost per pound of feed equaled 35 cents. A total of 242,322 lbs of fish were produced on 289,686 lbs of feed for an overall conversion of 1.19:1.

Length frequencies were taken prior to release. The average total length of fish reared at Niagara Springs was 8.11 inch (206 mm) on March 10 (Table 5). The average total length of fish reared by Lynn Babbington at Schrank's ponds was 9.69 inch (246 mm) on April 6.

Fin quality was assessed using "The Ashton Method" of qualitative fin measurement. Fins from fish reared at Niagara Springs and Schrank's ponds were compared to fins of wild rainbow trout collected from the Henrys Fork. A total of 120 fish from six different raceways at Niagara Springs were analyzed for fin degradation, while 20 fish were analyzed from Schrank's ponds. After measuring the dorsal and two pectoral fins from each fish and comparing the average fin length to the average forked length, fins from fish reared at Niagara Springs were only 52.8% of wild fish fins (Table 6). Fins from fish reared at Schrank's ponds were 48% of wild fish fins. Much of the fin degradation occurred in the crowded hatch-house vats prior to clipping. Dorsal fins on released smolts were almost nonexistent, while pectoral fins were eroded.

Wild steelhead fins were 120% of wild rainbow fins, suggesting that larger fins have evolved to help steelhead migrate to the ocean. If fins from fish reared at Niagara Springs and Schrank's ponds were compared to fins from wild steelhead, the fin percent would have been even lower. This clearly indicates that fish with longer fins (more natural) need to be reared. Studies by Bertellotti (1990 Niagara Springs Brood Year Report) showed that an obvious correlation existed between high density rearing and fin degradation. A larger hatch-house with increased rearing volume would be very beneficial to reducing degradation of fish fins.

Tankers belonging to IPC and Neil Ring began hauling from Niagara Springs on April 10 and finished on April 19. A total of 40 loads of smolts were taken to Hells Canyon Dam and four points along the Salmon River. A total of 1,001,794 smolts were released weighing 219,185 pounds. Average fish size was 4.5 fish/lb. Release figures are as follows: Pahsimeroi Hatchery weir received 379,948 fish at 4.8 fish/lb; MacNab Point received 199,962 at 4.6 fish/lb; the North Fork of Salmon River received 134,979 at 4.7 fish/lb; Pine Bar Rapids received 21,070 at 4.3 fish/lb; and Hells Canyon Dam received 265,835 at 4.14 fish/lb (Table 3).

Table 4. Niagara Springs Hatchery Production Costs.

Number of fish	Pounds of feed	Cost of feed	Pounds of fish	Conversion	Total cost	Cost/ 1,000	Cost/ Pound
1,513,154	289,686	\$94,807.95	242,322	1.195	\$332,533	\$219.76	\$1.37

Table 5. Length-frequencies at release.

Raceway #	Pahsimeroi		Hagerman National Fish Hatchery		Hells Canyon		Babbington's ponds
	3	4	7	8	11	14	
Sample size	20	20	20	20	20	20	20
Average, mm	203	202	204	204	216	206	246
Lower range, mm	172	172	173	170	146	175	204
Median, mm	203	202	204	204	216	206	246
Upper range, mm	236	237	230	244	248	250	308

	(mm)	(in)
Pahsimeroi average length	203	7.99"
Pahsimeroi/Hagerman National Fish Hatchery average length	204	8.03"
Hells Canyon average length	211	8.31"
Babbington's ponds average length	246	9.69"
Overall average length	216	8.50"

Table 6. Fin lengths of Niagara Springs steelhead.

Niagara Springs raceway	Average of 20 fish groups (mm)						
	Total length	Fork length	Right pectoral	Left pectoral	Dorsal	Fin length	Fin factor
3	203	195	13	16	7	12	48
4	202	194	15	16	4	12	46
7	204	194	18	19	6	14	56
8	204	194	20	18	6	15	57
11	216	204	17	16	10	14	54
14	206	196	16	17	10	14	56
Average	206	196	17	17	7	14	53
Babbington's ponds							
	246	234	20	16	8	15	49

FISH HEALTH

Fish health is always a concern at Niagara Springs Hatchery. The location of Niagara Springs in the heart of the commercial trout industry makes it vulnerable to horizontal transmission of many etiologic agents. Disease problems from IPNV, IHN, bacterial furunculosis Aeromonas salmonicida, and bacterial coldwater disease Flexibacter psychrophilus have caused significant losses in years past. Also, the hatchery and spring (water source) are located directly below agricultural land, exposing both to toxic drift and runoff from chemical application to fields above the hatchery. Stringent sanitation programs are implemented to facilitate disease control. Reduction of steelhead numbers reared at Niagara Springs Hatchery since 1992 has produced a better quality smolt.

All raceways except one had occurrences of IHN. Hells Canyon fish in raceway 12 became infected on July 24, 1993. This coincides with the arrival of fish-eating birds two weeks prior. At the time of infection, these fish averaged between 130 and 150 fish/lb. Horizontal transmission spread the disease to all raceways except one. An experiment to hold one group of fry as long as possible inside the incubation room proved successful. When this lot of fish were ponded, all of the other IHN disease problems had subsided and the number of birds had declined. Also, earlier problems with bird netting had been corrected. Mortality was estimated to be 775,000 (40%) over the two-month period of infection.

Differences in organosomatic index parameters could be attributed to a later analysis date this year. Flexibacter psychrophilus was usually found after the epizootic of IHN had reached its peak. Once the epizootic was over, disease seemed to be less significant in the production process at Niagara Springs. Flexibacter psychrophilus and Aeromonas hydrophila were isolated in February 1994. A chronic mortality was associated with these bacteria. Aeromonas salmonicida was not isolated at any time.

A pre-release sampling of smolts produced positive results for IPNV in the group of fish that came from Hagerman National Fish Hatchery. However, there were no increases in mortality.

This will be the last year fish will be reared by a private enterprise while Niagara Springs Hatchery is being renovated. "Fish being reared privately were comparable in size to Niagara Springs fish, but once again, gills were marginal and, in a few cases, a gill disease was ongoing. IPNV was isolated from Babbington's Juker facility. A granuloma (presumptive) was found in the spleen of fish during preliberation." (Munson, Eagle Fish Health Laboratory, Niagara Springs Hatchery Disease Summary, 1994).

Adipose fin-clipping began in mid-October and proceeded through early November just after peak illness. Soon after ad-clipping, the fish encountered a small outbreak of coldwater disease and were fed medicated feed, Oxytetracycline (TM-100, 4,000g/ton), for 14 days.

FISH MARKING

Fin Clipping

All hatchery-reared steelhead in the state are marked with an adipose fin clip. Adipose clipping is done so that sportsmen can differentiate hatchery and wild steelhead. The clipping process also gives the hatchery staff an accurate inventory of fish on the station. Steelhead at Niagara Springs Hatchery were adipose clipped between November 8 and November 19, 1993. Niagara Springs fish were clipped last because of IHN and scheduling.

Coded Wire Tags and PIT Tags

Brood year 1993 steelhead were CWT from November 30 through December 2, 1993. A total of 234,705 fish were CWT and LV fin-clipped (Table 7).

Lynn Babbington received 103,699 CWT fish. These Hells Canyon fish had a CWT retention of 97.15%. The 60,384 released at Hammer Creek had CWT number 10-15-32 and the 40,940 released at Hells Canyon had number 10-46-22.

Remaining at Niagara Springs were 131,006 CWT fish, of which 85,894 were Pahsimeroi stock and 45,112 were Hells Canyon stock. The CWT retention of these fish was 97.88%. Of the Pahsimeroi stock smolts, there were 41,422 with CWT numbers 10-47-01 and 10-47-02 released at Pahsimeroi. There were 21,538 with CWT number 10-47-03 released at Challis and 20,879 with number 10-47-04 released at North Fork. A total of 44,142 Hells Canyon stock smolts with CWT number 10-46-23 were released at Hells Canyon Dam.

On February 25 and 26, the quality of adipose fin clipping and retention of CWT was checked, while 918 fish received PIT tags (Table 8). PIT-tagged fish were released as follows: 316 Pahsimeroi stock fish went to Pahsimeroi, 200 went to Challis, and 200 went to North Fork, while 202 Hells Canyon stock went to Hells Canyon Dam. Only one PIT tag mortality (number 7F7D7C2C3A) was found.

Lynn Babbington's fish received 500 PIT tags, and only one mortality (number 1F2E31186A) was found. Three hundred fish were released at Hammer Creek and 200 at Hells Canyon Dam. No special mark was applied to fish that received PIT tags.

RECOMMENDATIONS

Completed Improvements

Building Maintenance and Hatchery Improvements

Residential housing units had new carpeting and linoleum installed. The trailer was equipped with new carpeting, linoleum, gutters, drapes, blinds, toilet, bathroom sink, oven, and dishwasher. All of the old insulation above the hatchery office was removed and replaced with a dust resistant plastic lining and new insulation. The office received new carpeting with carpet savers around office desks. A second phone line to accommodate a modem was installed. The office and public restrooms have been painted. Idaho Power Company provided framed pictures to hang on the office walls.

Table 7. Brood year 1993 tag summary for steelhead at Niagara Springs Hatchery.

CWT number	Number tagged	Mortality to release	Percent tag retention	Tagged fish released	Release site
Niagara Spring					
10-47-01	21,018	510	98.00%	20,508	Pahsimeroi weir
10-47-02	21,433	519	98.30%	20,914	Pahsimeroi weir
10-47-03	21,959	421	98.30%	21,538	Challis-McNab Point
10-47-04	21,484	605	97.50%	20,879	North Fork Salmon River
10-46-23	45,112	970	97.80%	44,142	Hells Canyon Dam
Total	131,006	3,025	97.88%	127,981	
Babington Ponds					
10-15-32	62,422	2,038	97.15%	60,384	Hammer Creek
10-46-22	41,277	337	97.15%	40,940	Hells Canyon Dam
Total	103,699	2,375	97.15%	101,324	
Grand total	234,705	5,400		229,305	

Table 8. Brood year 1993 PIT tag summary for steelhead at Niagara Springs Hatchery.

Pit code	Number tagged	Percent tag retention	Tagged fish released	Release site
Niagara Springs				
DAC94056.05N	316	100%	316	Pahsimeroi Weir
DAC94057.N06	200	100%	199	Challis-McNab Point
DAC94057.N10	200	100%	200	North Fork Salmon River
DAC94057.N11	100	100%	100	Hells Canyon Dam
DAC94057.N12	102	100%	102	Hells Canyon
Total	918		917	
Babington Ponds				
DAC94053.BB1	200	100%	200	Hells Canyon
DAC94056.BB2	150	100%	149	Hammer Creek
DAC94056.BB3	150	100%	150	Hammer Creek
Total	500		499	
Grand total	1,418		1,416	

Hatchery Construction

A \$3.9 million project was started in September to reduce pollution and improve steelhead production. The project is to include the construction of five new raceways for fish production and two large flow-through settling basins to settle out fish wastes, an air cleaning system for raceway cleaning, a water spray system for predator avoidance, the construction of a new chiller building and storage area, upgrading the visitor area, refurbishing existing raceways, painting of existing nursery areas with dark paint, and repositioning of the intake and outlet pipes.

Other modifications include moving the two feed bins and fitting them with a vibrating feed delivery system and new conveyor, painting the bridge and fitting it with handrails and electrical boxes, installing a new bridge over the new raceways, enclosing the settling ponds and raceways with chain link fence, moving fire hydrants and adding new firehose cabinets, and laying new asphalt throughout the property.

As soon as construction is complete in August 1994, the rest of the project will involve landscaping the entire premises, including the park across the creek. This will include installing pop-up sprinklers, a new vault-type toilet in the park, and placing bushes, shrubs, and trees around the property. Any remaining dirt areas will be hydroseeded with drought resistant grasses.

Needed Improvements

Early Rearing and Incubation

The upwelling incubators and circular vats are not adequately designed to safely hatch and rear fry that are required for the station's mitigation. Because of high rearing densities, suffocation occurs when fish are allowed to swim out of incubators and subsequently pile up on the bottom of vats.

An expansion of the present nursery facility to at least twice the present size would adequately accommodate early rearing systems. In this expansion, the 20 round early rearing tanks should be replaced with early rearing raceways. The number of nursery raceways should be based on optimum density indices and the grow-out time needed to get the fish to a larger size (250-500 fish/lb) before moving them to outside raceways. This system would increase the rearing volume, protect smaller fry from bird predation, and provide them with shade from the sun.

The current incubation water intake is shared with the irrigation and domestic systems. When the irrigation lines are activated, air is taken into the system causing "bubbling" in the incubators. Air is then trapped beneath the eggs and causes suffocation. A new line that is separate from the irrigation and domestic lines needs to be built to accommodate the nursery facilities. Currently there is not enough water to operate all the nursery vats because of reduced spring flows.

Final Rearing

An investment in aluminum dam boards would reduce expense for the constant replacement of wooden boards and help prevent disease transmission.

Employee Safety

The eight-inch wide raceway walls are used as walkways to clean screens and raceway sides and bottoms. Walking these walls is a safety problem all year round and becomes extremely dangerous in the winter. Non-skid walkways need to be installed the full length of the raceway wall to eliminate this hazard.

A "trash-rack" needs to be installed in front of the intake gate at the upper pool to prevent access to the spring and possible injury to the public.

Hatchery Residences

There is a need for television station reception. The installation of satellite dishes and receivers would improve morale and may keep employees around after work hours, adding to the security of the station.

With the degradation of the spring water, domestic water must be treated by chlorination before use. Coliform and fecal conform bacteria have been found in the drinking water. The digging of an underground domestic well would eliminate water being drawn from an open air source (airborne contaminants). Several people who drank the water reported having diarrhea or feeling sick. Installation of water filters on residential faucets may alleviate this problem for the employees, but the public drinking water system could still be contaminated.

There is also the need for one more wood frame house that would replace the old trailer. There are four full-time employees at this station and adequate housing for only three.

Water Source

Niagara Springs Hatchery has a water right of 132 cfs. Niagara Springs volume has been declining yearly, as have most of the springs in this part of the Snake River area. Output of area springs as measured by the Idaho Aquaculture Association has dropped approximately 2,000 cfs in the last ten years. Also, there is a noticeable decline in water volume that coincides with the start of pumping water out of the aquifer for irrigation in the spring of the year.

The water collection box that supplies the incubation rooms is located near the top of the spring and the amount collected is not enough to safely produce fry. It would seem reasonable to move the collection box to a place in the spring where more water could be collected. However, this is not possible because of interfering with a population of endangered snails and their habitat. Therefore, plans are being made to tap into the existing pipeline delivering water to the raceways, or the hatchery headpool, as a new supply source.

Idaho Power Company has entered into an agreement with Rim View Trout Company regarding future water use of Niagara Springs. Because of this year's agreement for a maximum of 70 cfs, production levels at Niagara Springs Hatchery were reduced.

With five new raceways and production levels increasing to 400,000 pounds of smolts next year, a need for more than 70 cfs will occur. A stepped agreement has been signed by the five users of Niagara Springs water whereby Niagara Springs Hatchery will receive water according to a stepped flow chart (Table 3, Stepped Water Use). Niagara Springs Hatchery will receive an additional 50 cfs from Rimview Trout Company at the springs according to fish production needs at Niagara Springs. Rimview, in turn, may receive up to 75 cfs from the tailrace at Niagara Springs.

Building Improvements

Buildings for storage, incubation, and early rearing are lacking for the effective operations of Niagara Springs Hatchery. Storage of equipment has been in the work areas of the garage and shop. This has created a safety hazard in those work areas and has eliminated much of the area needed for maintenance and repairs. A separate storage facility and garage are needed if the hatchery is to provide a safe and productive work environment for its employees. Public restrooms do not meet handicap access requirements and should be replaced or modified.

The park area across the creek needs to be upgraded with public restrooms and a bigger parking area with guard rails to separate it from the park itself. A new pop-up irrigation system is required. Additional protection is needed for trespassing swimmers and wildlife at the hatchery's water intake and head pool.

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A P P E N D I C E S

Appendix 1. Niagara Springs Hatchery, brood years 1966 to present.

Year	Pahsimeroi eggs\ fry received	Oxbow eggs\ fry received	Total eggs\ fry received	Total yearly mortality	Percent mortality yearly	Fall releases	Salmon River smolt releases	Hells Canyon smolt releases	Total spring releases	Pounds released	Feed fed total pounds	Conversion	Fish/ pound
1965-66	0	3,085,194	3,085,194	---	---	---	---	---	---	---	---	---	---
1966-67	0	2,605,288	2,605,288	623,533	23.93	29,400	1,364,842	587,513	1,952,355	153,552	305,890	1.99	12.71
1967-68	0	3,215,652	3,215,652	1,209,183	37.60	0	1,664,325	342,144	2,006,469	204,251	298,450	1.46	9.82
1968-69	0	2,469,536	2,469,536	695,219	28.15	0	1,665,117	109,200	1,774,317	184,186	280,430	1.52	9.63
1969-70	1,477,695	1,927,727	3,405,422	654,022	19.21	757,500	1,608,000	385,900	1,993,900	299,235	502,410	1.68	6.66
1970-71	1,330,494	1,480,150	2,810,644	(305,176)	-10.86	670,960	1,630,002	0	2,444,860	202,025	384,040	1.90	12.10
1971-72	1,439,842	700,061	2,139,903	153,603	7.18	215,625	1,555,050	0	1,770,675	235,375	376,080	1.60	7.52
1972-73	8,850,764	1,819,721	10,670,485	3,105,637	29.10	3,008,664	1,543,349	0	4,556,184	163,839	266,800	1.63	27.81
1973-74	3,663,990	1,264,384	4,928,374	2,953,847	59.94	0	1,960,378	0	1,974,527	187,494	319,130	1.70	10.53
1974-75	3,160,144	280,098	3,440,242	2,108,426	61.29	0	1,331,280	0	1,331,816	166,640	352,890	2.12	7.99
1975-76	2,234,978	51,559	2,286,537	513,688	22.47	40,977	1,690,390	0	1,731,872	248,708	437,600	1.76	6.96
1976-77	2,487,824	730,862	3,218,686	1,642,383	51.03	0	1,433,675	141,005	1,576,303	251,835	454,762	1.81	6.26
1977-78	2,540,728	517,250	3,057,978	1,229,537	40.21	281,208	1,266,025	0	1,547,233	154,829	370,080	2.39	9.99
1978-79	2,048,350	441,069	2,489,419	426,977	17.15	344,944	1,372,454	0	1,717,498	244,887	643,680	2.63	7.01
1979-80	2,622,425	124,814	2,747,239	203,985	7.43	548,987	1,097,060	348,220	1,994,267	314,100	629,580	2.00	6.35
1980-81	1,697,010	498,416	2,195,426	720,172	32.80	0	862,494	612,760	1,475,254	316,330	622,930	1.97	4.66
1981-82	2,003,418	298,952	2,302,370	953,015	41.39	0	995,205	354,150	1,349,355	374,350	663,850	1.77	3.60
1982-83	2,313,339	253,776	2,567,115	1,431,975	55.78	500,000	542,390	92,750	635,140	181,150	448,860	2.48	3.51
1983-84	2,749,292	709,716	3,459,008	1,849,313	53.46	449,070	752,195	408,430	1,160,625	310,000	632,400	2.04	3.74
1984-85	2,333,760	598,404	2,932,164	613,771	20.93	630,500	1,273,181	414,712	1,687,893	314,650	541,198	1.72	5.36
1985-86	1,332,152	1,582,340	2,914,492	903,999	31.02	330,640	860,358	819,495	1,679,853	339,885	580,850	1.71	4.94
1986-87	1,339,176	935,195	2,274,371	422,476	18.58	39,995	1,011,900	800,000	1,811,900	419,000	557,960	1.33	4.32
1987-88	1,640,040	1,289,029	2,929,069	775,569	26.48	404,000	872,100	877,400	1,749,500	405,515	584,290	1.44	4.31
1988-89	1,256,289	1,213,399	2,469,688	803,488	32.53	0	930,700	735,500	1,666,200	406,800	574,770	1.41	4.10
1989-90	1,925,795	833,397	2,759,192	252,892	9.17	603,000	956,100	947,200	1,903,300	465,400	597,310	1.25	4.09
1990-91	1,966,434	113,190	2,079,624	311,624	14.98	0	856,000	912,000	1,768,000	484,025	632,030	1.28	3.65
1991-92	650,400	691,500	1,341,900	311,400	23.21	0	786,600	243,900	1,030,500	232,500	283,000	1.22	4.43
	Wa	812,000	812,000	394,936	48.64	0		417,064	417,064	72,786			5.73
1992-93	1,131,951	1,013,846	2,145,797				761,800	353,600		235,075			
1992-93	Babington's						*222,560	306,907	**47,089	131,090			
1993-94	954,294	1,509,596	2,463,890	1,263,820	54.89	0	928,111	51,538.096	350,151	440,143	1.26	4.40	

* Babington's released Little Salmon

** Brownlee Reservoir

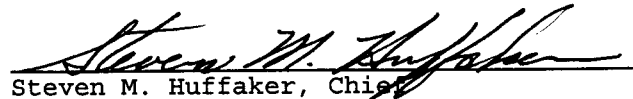
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